s18: EXP LOG (SLTN v306)
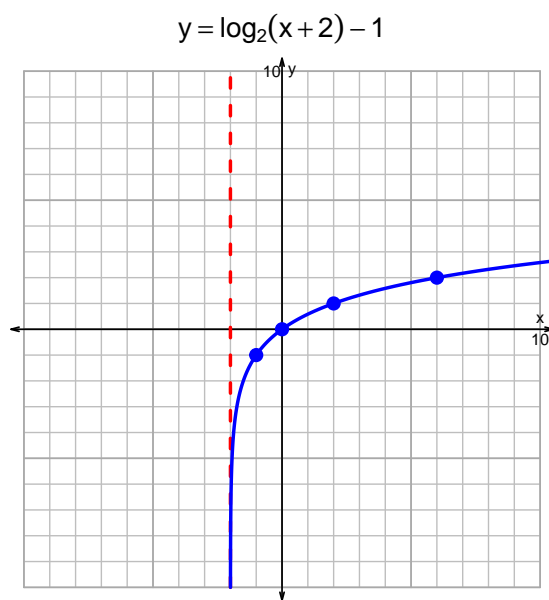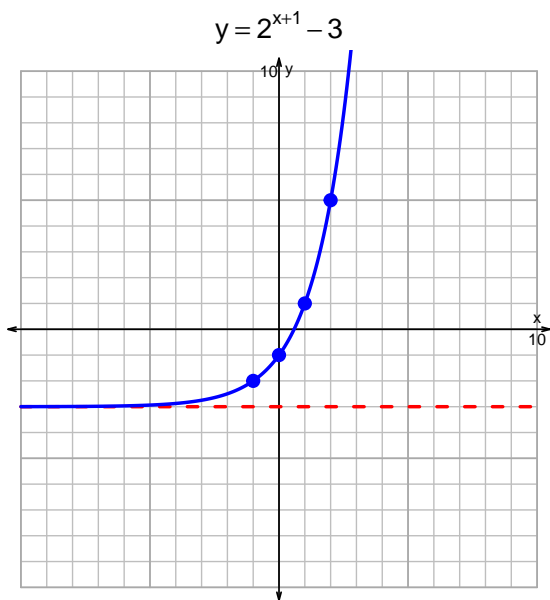
1. (10 pts) Graph $y = 2^{x+1} - 3$ and $y = \log_2(x + 2) - 1$ on the grids below. Also, draw any asymptotes with dashed lines.

$y = 2^{x+1} - 3$

$y = \log_2(x+2) - 1$

Somewhat useful hint: $2^3 = 8$, and thus $\log_2(8) = 3$.

2. (10 pts) Write (but do not evaluate) the solution to the equation below by writing a logarithmic expression. Please do not do any arithmetic; just move numbers around.

$$-29 = \left(\frac{-5}{4}\right) \cdot 2^{-7t/3}$$

Divide both sides by $\frac{-5}{4}$.

$$\frac{29 \cdot 4}{5} = 2^{-7t/3}$$

Take log, base 2, of both sides.

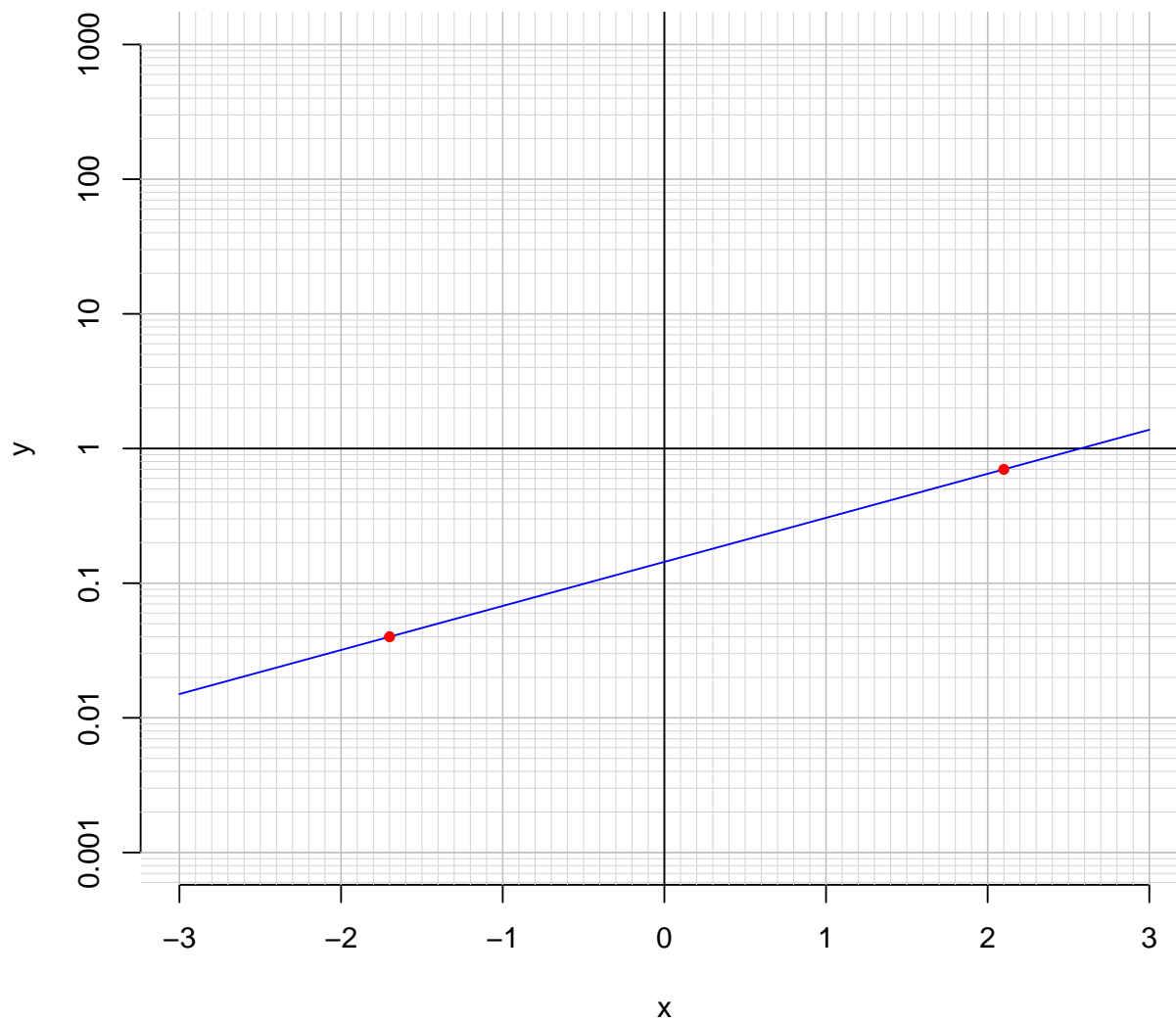$$\log_2\left(\frac{29 \cdot 4}{5}\right) = \frac{-7t}{3}$$

Divide both sides by $\frac{-7}{3}$.

$$\frac{-3}{7} \cdot \log_2\left(\frac{29 \cdot 4}{5}\right) = t$$

Switch sides.

$$t = \frac{-3}{7} \cdot \log_2\left(\frac{29 \cdot 4}{5}\right)$$

3. (10 pts) An exponential function $f(x) = 0.144 \cdot e^{0.753x}$ is graphed below on a semi-log plot.

a. Using the plot above, evaluate $f(-1.7)$.

$$f(-1.7) = 0.04$$

b. The inverse function is logarithmic.

$$f^{-1}(x) = \frac{1}{0.753} \cdot \ln\left(\frac{x}{0.144}\right)$$

Using the plot above, evaluate $f^{-1}(0.7)$.

$$f^{-1}(0.7) = 2.1$$